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Investigating Literacy as a Predictor of Adoption and Usage

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ABSTRACT

Personal health records (PHRs) are gaining popularity. As more consumers gain exposure, the traditional predictors of adoption and usage do not always apply. While awareness has been identified in some early studies, the consumers themselves may lack the necessary health literacy skills to understand PHRs. People with limited health literacy skills also may have limited technology skills that may preclude them from adopting and using PHRs. This study addresses the question: Is Health literacy a predictor of PHR adoption and usage? The work in progress includes a literacy test, followed by usage surveys to evaluate PHR usage.

Keywords

Personal health records, adoption, health literacy

INTRODUCTION

Personal Health Records (PHRs) have emerged as a new option for consumers to control and track their medical data. Large insurance groups have provided access for their patients; Google entered the market with its "Google PHR". For example, Aetna Inc. recently unveiled a plan to give 15 million subscribers access to their health information (Havenstein 2007) with more insurers following suit, while, Kaiser Permanente plans to make available medical records - including histories, lab results, progress notes and prescriptions - to 2 million patients (Hines 2007). Even with all this exposure and access, nearly half of all Americans are still unaware of PHRs (Sprague 2006). PHRs have remained relatively under researched and the drivers for PHR adoption have yet to be explored. Unlike traditional technology adoption, PHRs contain an individual's personal health information thus providing them direct benefits; PHR information also creates a heightened sense of privacy and security.

One of the predictors of adoption and usage may be literacy; specifically health literacy. According to the IOM (2004) and other sources, to be health literate requires being competent to locate, obtain, and comprehend basic health information in order to make health decisions and follow treatment instructions (American Medical Association Foundation, 2008; Medical Library Association, 2007; National Network of Libraries of Medicine, 2008; U. S. Department of Health and Human Services; Zarcadoolas, Pleasant, & Greer, 2006). In 2003, the U. S. Surgeon General identified being health literate as critical to the success of eliminating health disparities, and preventing disease (Zorn et al., 2004). There are many tools and technologies available for consumers to become more involved in their healthcare; consumers may not have the health information literacy competencies to identify, comprehend, evaluate, and use these resources. Low literacy levels also negatively impact users' ability to comprehend much of the consumer health information that is currently available.

The 2003 National Assessment of Adult Literacy found that 70 million Americans have at or below health literacy levels. (Kutner, Greenberg, Jin, & Paulsen, 2006). Patients with low literacy scores have difficulty understanding written medication instructions and following prescribed treatment guidelines, are more likely to be hospitalized, and have poorer health in general (Florida Literacy Coalition, 2007). Students may be a key target for PHRs (they are technology savvy and on the cusp of the information age) but their literacy levels may prevent them from adoption and usage. This research addresses the question: Is Health literacy a predictor of PHR adoption and usage? The study includes a literacy test, followed by usage surveys to evaluate PHR usage. The sample population of undergraduates is being exposed to PHRs for the first time. Data has been collected and analyzed and will be presented at the Conference.

Personal Health Records

The National Committee on Vital and Health Statistics (National Committee on Vital and Health Statistics 2006) recognizes that "there is no uniform definition of 'personal health record' in industry or government, and the concept continues to evolve." A personal health record (PHR) is considered to be a patient-generated and maintained compilation of complete and accurate health and medical history, including information such as, symptoms and medication use, information from doctors

(e.g., diagnoses and test results), and information from their pharmacies and insurance companies (AHIMA 2005; Foundation 2004). Another broad definition defines PHRs as any application that enables a patient to create, review, annotate or maintain a record of their health condition, medication, medical problems, allergies, vaccination history, visit history, or communications with their healthcare providers' (Cheow et al. 2007; Win 2006; Win et al. 2006).

PHRs can be created by using commercially available applications that are standalone (independent) or web-based; automatically using transaction data from sources such as health plans or pharmacies; or automatically using data stored in a health provider's EHR system. The second method for offering PHR using transaction data is often termed "tethered" as this type of PHR is maintained and controlled by the health plan, provider organization, or employer; at least 70 million Americans have access to this type of PHR (Sprague 2006). In general, benefits of PHR adoption include, secure online access, comprehensive personal health history, means to become own health advocate, benchmarks and prompts for maintenance, "health spreadsheet," fluid provider communication, and automatic data entry (Morrissey 2005).

Enrollment in PHRs is increasing as more Americans gain access to their personal health through four types of providers (Association et al. 2006): employers, insurance companies, healthcare providers, and independent entities - profit and non-profit, such as banks (Baker 2007) or the American Medical Association (http://www.iHealthRecord.com). Corporate America has begun to offer PHRs for employees. The recent announcement by Applied Materials Inc., BP America Inc., Pitney Bowes and Walmart Stores Inc. to offer "Dossia" for 2.5 million employees (Porter 2006) is just one of the latest indications of the spread of PHRs. Academic institutions, such as the University of Nebraska ("University Students" 2007) and Washington University in St. Louis ("Online system" 2007), are beginning to drive change by offering PHRs to faculty, staff and students. The U.S. federal government is also promoting the use of PHRs; the Personalized Health Information Act (H.R. 1368) was introduced March 2007, with the intent to financially reward physicians who provide transportable PHRs. The presence of Google in the PHR market has increased awareness of PHRs but also created a concern for privacy of patient data. While PHRs offer many advantages, they also raise concerns of privacy, confidentiality, standardization, and accuracy (Endsley et al. 2006; Kim et al. 2004; Medicine 2001).

Innovation Adoption and Health Literacy

Health literacy is "the ability to understand and act on health information" (McCray 2005). For the adoption and usage of PHRS, the consumer must be able to obtain, process, and understand at least basic levels of health education. Similar to other technologies, understanding brings more adoption and usage. Navigating the medical maze and the jargon may prevent usage of PHRs even if access is available. Tang et al. (Tang et al. 2006) suggests that adult PHR-related education could be provided when an illness occurs or there is concern for illness in another, as this is often a teachable time.

The theoretical basis for the adoption of PHRs is derived from classic adoption innovation frameworks (Rogers 1995). Awareness of PHRs must exist before individuals can adopt – the first stage of the innovation-decision process (Rogers, 1995). This is still an issue; a survey from 2005 (Association et al. 2006) found that 83% had never used a PHR; of those respondents, 52% had not heard of a PHR. Patients who believe that PHRs offer an advantage over the current medical records system for maintaining health will be the first adopters (Rogers 1995). This perceived advantage will increase adoption. With reference to trialability and complexity, the interoperability of the PHR with the EMR to share information will be critical to the adoption process. A significant barrier to using a PHR is the complexity in setup; the more time a consumer must spend entering data, the less likely they will be to fully utilize or maintain it. In order to reduce the amount of time the consumer will spend, and further to minimize the potential for data entry error, PHRs should be integrated with EHRs or EMRs We anticipate that those individuals offered PHRs which are integrated with EHRs will adopt PHR at higher rates.

Beyond the Rogers framework, early research of intention to adopt new technology included many models. They include the theory of reasoned action (TRA) (Fishbein et al. 1975), theory of planned behavior (TPB) (Ajzen 1991), the technology acceptance model (TAM) (Davis 1989), and an updated TAM (Venkatesh et al. 2000). In Venkatesh's unified approach to adoption, the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003), he attempted to synthesize previous work. The UTAUT model formed the basis of this research.

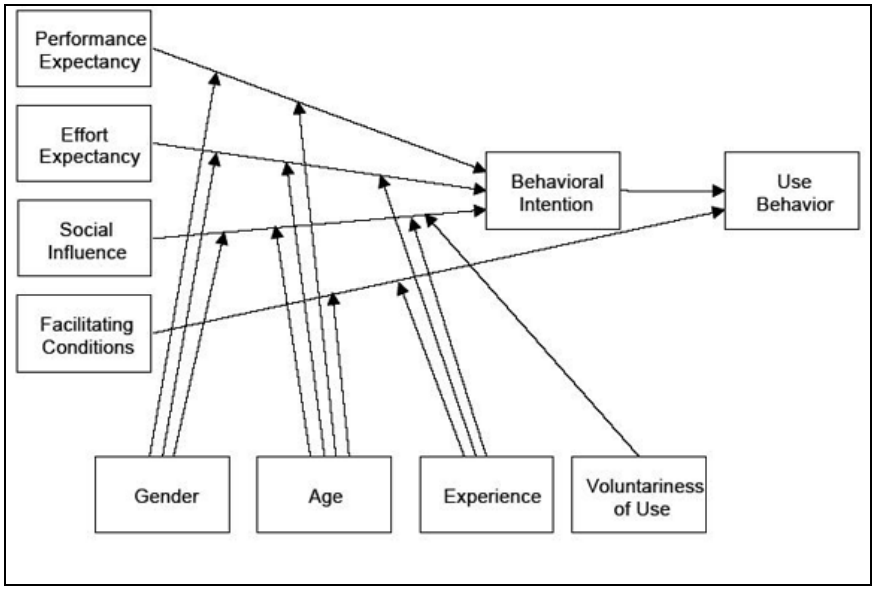

Figure 1. UTAUT model was modified for our study

METHODOLOGY

A health literacy questionnaire was used as a pre-survey tool (see Appendix A). The survey was administered to a class of undergraduate students taking a health informatics course. The students had no prior health courses. There were 90 students in the course and all filled out the health literacy questionnaire. Questionnaire was anonymously coded with a key and distributed back to the students. The students then recorded that key on the pre and the post surveys. PHR was not discussed prior to the 1st survey. Students were given the pre-PHR survey in week 5, the topic of PHRs was discussed in week 6-7, and a post survey was administered in week 9. There was no obligation on the student's part to complete the surveys. 80 pre-PHR surveys and 48 Post PHR surveys were obtained.

PRE-PHR SURVEY Variables included:

Access	- Author Defined
Perceived Influence	- Author + Venkatesh (2003)
Self Efficacy	- Author + Venkatesh (2003)
Perceived Usefulness	- Davis (1989), Koufaris (2002)
Intention to Use	- Venkatesh (2003)

POST-PHR SURVEY Variables included:

Performance Expectancy	- Venkatesh (2003)
Attitude	- Venkatesh (2003)
User Intention	- Venkatesh (2003)
Information Privacy	- Parasuraman et al (2005)
Social Infuence	- Venkatesh (2003)
Anxiety	- Venkatesh (2003)
Effort Expectancy	- Brook (1996)
Vendor Trust	- Koufaris (2004)

RESULTS

Following the # instruments being administered, the data was analyzed.

DISCUSSION

We expected that respondents with high health literacy would be more inclined to see a usefulness and indicate an intention to use. We expected that the post survey would reaffirm that user intention.

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Appendix A - Literacy Survey

1.	**Acute**	❑	**short and severe**	❑	**gradual**	❑	**painless**	❑	**don't know**	*Kesselman et al., 2007*
2.	**Artery**	❑	nerve	❑	muscle	❑	blood vessel	❑	don't know	"
3.	**Chronic**	❑	immediate	❑	long-term	❑	burning	❑	don't know	"
4.	**Diabetes**	❑	disease	❑	test	❑	procedure	❑	don't know	"
5.	**Hormone**	❑	herbal pill	❑	vitamin	❑	chemical	❑	don't know	"
6.	**Pulse**	❑	heart beat	❑	breathing	❑	temperature	❑	don't know	"
7.	**Renal**	❑	heart	❑	kidney	❑	lung	❑	don't know	"
8.	**Aneurysm**	❑	urinary tract	❑	bones	❑	blood vessels	❑	don't know	"
9.	**Diastolic**	❑	blood pressure	❑	temperature	❑	breathing	❑	don't know	"
10.	**Cancer**	❑	broken bone	❑	tumor	❑	allergy	❑	don't know	"
11.	**Asthma**	❑	lungs	❑	heart	❑	kidneys	❑	don't know	"
12.	**Muscle**	❑	taste	❑	hearing	❑	movement	❑	don't know	"
13.	**Calorie**	❑	fat	❑	energy unit	❑	cholesterol	❑	don't know	*Authors*
14.	**Respiratory**	❑	heat	❑	ears	❑	lungs	❑	don't know	"
15.	**Ulcer**	❑	digestive problem	❑	breathing problem	❑	movement disorder	❑	don't know	"
16.	**Biopsy**	❑	treatment	❑	test	❑	nutrition program	❑	don't know	"
17.	**Condition**	❑	problem	❑	fitness level	❑	diagnosis	❑	don't know	*Authors*
18.	**Prescription drugs**	❑	food	❑	medicine	❑	cleaning supplies	❑	don't know	"
19.	**Arthritis**	❑	instrument	❑	disease	❑	liquid	❑	don't know	"
20.	**Osteoporosis**	❑	medicine	❑	procedure	❑	disease	❑	don't know	"
21.	**Inflammation**	❑	pain and swelling	❑	numbness	❑	heavy bleeding	❑	don't know	"
22.	**Lumbar**	❑	lower back	❑	shoulders	❑	neck	❑	don't know	"
23.	**Fibromyalgia**	❑	treatment	❑	test	❑	disease	❑	don't know	"
24.	**Scoliosis**	❑	spine	❑	throat	❑	heart	❑	don't know	"
25.	**Cancer**	❑	infection of cells	❑	spread of abnormal cells	❑	low white blood cell count	❑	don't know	"
26.	**Muscle**	❑	tissue that connects organs	❑	tissue that covers organs	❑	tissue that can contract	❑	don't know	"
27.	**Abdominal**	❑	chest	❑	stomach	❑	back	❑	don't know	*Authors*
28.	**Procedure**	❑	surgery	❑	treatment	❑	test	❑	don't know	*Authors*
29.	**Immunization**	❑	prevention	❑	treatment	❑	disease	❑	don't know	*Authors*
30.	**Bowel**	❑	circulation	❑	respiration	❑	digestion	❑	don't know	*Authors*